

## CLAIMS

What is claimed is:

- 1 1. An integrated circuit comprising:  
2 circuitry;  
3 a bond pad coupled to the circuitry and for interfacing the circuitry with  
4 an external circuit; and  
5 a special contact pad coupled to the circuitry, the special contact pad for  
6 use only when testing the circuitry.
- 1 2. The integrated circuit of claim 1, wherein the special contact pad is smaller  
2 than the bond pad.
- 1 3. The integrated circuit of claim 1, wherein the special contact pad has a  
2 maximum dimension of approximately 10 microns.
- 1 4. The integrated circuit of claim 1, wherein the special contact pad is  
2 structured to receive a spring contact element.
- 1 5. The integrated circuit of claim 1, wherein the special contact pad is for  
2 communicating test data to the circuitry.
- 1 6. The integrated circuit of claim 1, wherein the special contact pad is for  
2 communicating data from the circuitry.
- 1 7. The integrated circuit of claim 1, wherein the special contact pad is for  
2 contacting a circuit node internal to the circuitry.
- 1 8. An integrated circuit comprising:  
2 a plurality of circuits;

3 a plurality of bond pads each coupled to at least one of the plurality of  
4 circuits, the plurality of bond pads for interfacing the plurality of circuits with  
5 circuits external to the integrated circuit; and

6 a plurality of special contact pads each coupled to at least one of the  
7 plurality of circuits and providing an electrical contact for communicating  
8 with the plurality of circuits.

1 9. The integrated circuit of claim 8, wherein the bond pads are arranged in a  
2 first predetermined alignment and the special contact pads are arranged in  
3 a second predetermined alignment.

1 10. The integrated circuit of claim 8, wherein the bond pads are disposed along  
2 the periphery of the integrated circuit, and at least one of the special  
3 contact pads is not disposed on the periphery of the integrated circuit.

1 11. The integrated circuit of claim 8, wherein the bond pads are aligned in a  
2 grid pattern on the integrated circuit, and at least one of the special contact  
3 pads is not aligned in the grid pattern.

1 12. The integrated circuit of claim 8, wherein the bond pads are aligned in a  
2 lead-on-center configuration, and at least one of the special contact pads is  
3 not aligned in the lead-on-center configuration.

1 13. The integrated circuit of claim 8, wherein the special contact pads are  
2 smaller than the bond pads.

1 14. The integrated circuit of claim 8, further comprising a spring contact  
2 element attached to one of the special contact pads.

1 15. The integrated circuit of claim 8, wherein at least one of the special contact  
2 pad is electrically disposed between two of the plurality of circuits to  
3 monitor signals transmitted between circuits.

1 16. The integrated circuit of claim 8, wherein one of the special contact pads  
2 communicates test data to one of the circuits, and another one of the  
3 special contact pads communicates an output of the circuit.

1 17. The integrated circuit of claim 8, wherein one of the special contact pads  
2 communicates test data to the one of the circuits, and one of the bond pads  
3 communicates an output of the circuit.

1 18. The integrated circuit of claim 8, wherein one of the bond pads  
2 communicates test data to one of the circuits, and one of the special contact  
3 pads communicates an output of the circuit.

1 19. The integrated circuit of claim 8, wherein in a first mode of operation one  
2 of the special contact pads communicates data to one of the circuits, and in  
3 a second mode of operation the special contact pads communicates data  
4 from the circuit.

1 20. The integrated circuit of claim 8, wherein one of the plurality of circuits is  
2 an embedded memory array, and the special contact pads communicates  
3 address and test data to the embedded memory array.

1 21. The integrated circuit of claim 8, wherein one of the plurality of circuits  
2 includes programmable circuitry, and the special contact pads are for  
3 communicating signals for programming the programmable circuitry.

1 22. The integrated circuit of claim 8, wherein the bond pads are structured to  
2 be connected to external circuitry by bonding wires, and the special contact

3 pads are not structured to be connected to external circuitry by bonding  
4 wires.

1 23. The integrated circuit of claim 8, wherein the bond pads are structured to  
2 be connected to external circuitry by solder bumps, and the special contact  
3 pads are not structured to be connected to external circuitry by solder  
4 bumps.

1 24. The integrated circuit of claim 8, wherein the bond pads are structured to  
2 be in electrical contact with a package for housing the integrated circuit,  
3 and the special contact pads are not structured to be in electrical contact  
4 with the package.

1 25. The integrated circuit of claim 8, wherein the plurality of circuits includes:  
2 a first circuit and a second circuit having a redundant function of the first  
3 circuit, and wherein the special contact pads are disposed about the first  
4 and second circuits to communicate with the first and second circuits.

1 26. The integrated circuit of claim 25, further comprising means for  
2 communicating with the special contact pads and for disabling the first  
3 circuit if it is defective and for enabling the second circuit.

1 27. The integrated circuit of claim 25, further comprising means for  
2 communicating with the special contact pads and for disabling the second  
3 circuit.

1 28. The integrated circuit of claim 8, further comprising electrostatic discharge  
2 protection circuitry for the bond pads and not for the special contact pads.

1 29. An integrated circuit comprising:  
2 a plurality of bond pads;

3 an internal circuit not directly monitorable by the bond pads; and  
4 at least one special contact pad for directly accessing the internal circuit.

1 30. The integrated circuit of claim 29, wherein the internal circuit comprises  
2 an embedded memory array, and the at least one special contact pad  
3 communicates address and memory data with the embedded memory  
4 array.

1 31. The integrated circuit of claim 29, wherein the internal circuit comprises  
2 programmable circuitry, and the at least one special contact pad  
3 communicates programming signals to the programmable circuitry.

1 32. The integrated circuit of claim 29, wherein the bond pads are arranged in a  
2 first predetermined alignment and the at least one special contact pad is in  
3 a second predetermined alignment.

1 33. The integrated circuit of claim 29, wherein the at least one special contact  
2 pad is smaller than the bond pads.

1 34. The integrated circuit of claim 29, further comprising a spring contact  
2 element attached to the at least one special contact pad.

1 35 A package for housing an integrated circuit, comprising:  
2 a plurality of terminals for testing the overall operation of the  
3 integrated circuit; and  
4 a special contact pad for directly accessing an internal circuit of the  
5 integrated circuit.

1 36. The package of claim 35, wherein the special contact pad is for  
2 communicating test signals for the integrated circuit.

1 37. The package of claim 35, wherein the special contact pad is for  
2 communicating test signals from the integrated circuit.

1 38. The package of claim 35, wherein the contact pads are aligned in a grid  
2 pattern on the integrated circuit, and the special contact pads is not aligned  
3 in the grid pattern.

1 39. The package of claim 35, wherein the package comprises a ball-grid-array  
2 (BGA) package and the contact pads include contact balls.

1 40. The package of claim 35, wherein the special contact pad is smaller than  
2 the contact pad.

1 41. The package of claim 35, wherein the special contact pad has a maximum  
2 dimension of approximately 10 microns.

1 42. A method of testing circuitry in an integrated circuit having bond pads  
2 and a special contact pad, the method comprising:  
3 providing test signals to the circuitry; and  
4 monitoring an output of the circuitry through the special contact pad.

1 43. A method of testing circuitry in an integrated circuit having bond pads  
2 and a special contact pad, the method comprising:  
3 providing test signals to the circuitry through the special contact pad;  
4 and  
5 monitoring an output of the circuitry through the bond pad.

1 44. A method of testing an integrated circuit having bond pads and a special  
2 contact pad, the method comprising:  
3 providing test signals to a first circuit through at least one of the bond  
4 pads;

5 monitoring an output of the first circuit through the special contact  
6 pad;  
7 providing the output of the first circuit to a second circuit; and  
8 providing an output of the second circuit to at least another one of the  
9 bond pads.

1 45. A method of testing an integrated circuit on a wafer, comprising:  
2 electrically contacting a first test substrate to special contact pads  
3 disposed on the integrated circuit; and  
4 electrically contacting a second test substrate to bond pads disposed on  
5 the integrated circuit.

1 46. A probe card comprising:  
2 a first probe element for contacting bond pads of an integrated circuit;  
3 and  
4 a second probe element for contacting a special contact pad of the  
5 integrated circuit

1 47. The probe card of claim 46, wherein the first and second probe elements  
2 comprise cantilevered probes.

1 48. The probe card of claim 46, wherein the first and second probe elements  
2 comprise contact balls.

1 49. The probe card of claim 46, further comprising a plurality of the first probe  
2 elements arranged in a first predetermined alignment, and wherein the  
3 second probe element is arranged in a second predetermined alignment.

1 50. The probe card of claim 49, wherein the predetermined alignment is a grid  
2 pattern.

- 1 51. The probe card of claim 49, wherein the predetermined alignment is a  
2 rectangular pattern.
- 1 52. The probe card of claim 49, wherein the first and second probe elements  
2 have different lengths.
- 1 53. The probe card of claim 49, wherein the first and second probe elements  
2 are spring contact elements.
- 1 54. The probe card of claim 53, wherein the spring contact elements include  
2 pyramid-shaped tip contact structures.
- 1 55. The probe card of claim 49, wherein the first and second probe  
2 elements are COBRA-style probes.
- 1 56. An apparatus for communicating signals with an internal circuit node and  
2 input/output (I/O) node of a semiconductor device, comprising:  
3 a first contact element for communicating signals with the internal  
4 circuit node; and  
5 a second contact element for communicating signals with the I/O node.
- 1 57. The apparatus of claim 56, wherein the first contact element comprises a  
2 resilient contact element.
- 1 58. The apparatus of claim 57, wherein the second contact element comprises  
2 a resilient contact element.
- 1 59. The apparatus of claim 56, wherein the first and second contact elements  
2 have different lengths.
- 1 60. A method of communicating a signal to an internal circuit node of a  
2 semiconductor device, comprising:



3           contacting a special contact pad that is electrically coupled to the  
4 internal circuit node; and  
5 transferring electrical energy through the special contact pad to the internal  
6 circuit node.

1   61. A socket for releasably connecting a first electronic component to a second  
2 electronic component, comprising:

3           a first plurality of resilient contact structures extending upward from a  
4 top surface of a support substrate, the first plurality of resilient contact  
5 structures for communicating signals with a first plurality of contact points of  
6 the first electronic component;

7           a second plurality of resilient contact structures extending upward from  
8 the top surface of the support substrate, the second plurality of resilient  
9 contact structures for communicating signals with a second plurality of  
10 contact points of the second first electronic component; and

11          a plurality of contact structures disposed on a bottom surface of the  
12 support substrate, selected ones of the contact structures are connected  
13 through the support substrate to selected ones of the resilient contact  
14 structures.

1   62. The socket of claim 61, wherein the second electronic component is a  
2 circuit board.

1   63. The socket of claim 61, further comprising means for receiving the first  
2 electronic component.

1   64. The socket of claim 61, further comprising means for urging the first  
2 electronic component down onto the first and second resilient contact  
3 elements.